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Quantifying the effects of climate and terrestrial storage on the interannual variability of actual evapotranspiration by a Budyko-based approach

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Knowledge of the temporal variability in actual evapotranspiration (ET) is essential for better understanding of the interactions and feedbacks between atmospheric and land surface hydrologic processes. On the basis of a long-term (1960–2012) land surface dataset, this study applies a variance decomposition framework to assess the effects of climate and terrestrial storage factors on the interannual variance of ET at 14 basins in China. The results show that climate is the primary source for ET interannual variance, and the dominant sources shift from potential evaporation (PET) in humid climates to precipitation (P) in arid climates. The interactions between P and PET tend to enhance the ET variance in arid climates and dampen it in humid climates. Terrestrial water storage change plays a role in enhancing ET variance in all 14 basins, especially in some areas of Xinjiang, the Southwest region, and the North China plain. The response of terrestrial storage to P is found to be more significant than its response to PET. Overall terrestrial storage and its responses to climate play a role in dampening ET variance in most basins, especially in those of the Huaihe, the Haihe, and the Yellow River.